Tasks (60 points):

● Task 1 (40 points): Create a real-time interactive plot of energy consumption and prediction

● Subtask 1 (20 pts): Static plot of gathered data

○ This graph will be quite involved and will be reactive to several user inputs. The horizontal axis must measure time and the vertical axis must measure energy consumption. The graph must allow the user to choose which meter (or meters) to plot, and then what time range to plot. To clarify, the user must be able to plot multiple meters on one graph. The graph must allow for the user to choose from four different units of time to plot on the horizontal axis: hour, day, week, and month. Within each unit of time, the user can choose to graph either "total consumption" or "average hourly consumption" by that unit of time. The seven different graph possibilities are laid out below.

■ **Horizontal Axis -** Hour (e.g. 1:00AM Jan 1, 2015 - 3:00PM Sep 2, 2020)

● **Vertical Axis -** Hourly Energy Consumption

■ **Horizontal Axis -** Day (e.g. Jan 1, 2015 - Sep 2, 2020)

● **Vertical Axis -** Total consumption (for each day)

OR

● **Vertical Axis -** Average hourly consumption (by day)

■ **Horizontal Axis -** Week (e.g. first week of 2020 - twentieth week of 2020)

● **Vertical Axis -** Total consumption (for each week)

OR

● **Vertical Axis -** Average hourly consumption (by week)

■ **Horizontal Axis -** Month (e.g. Jan 2019 - Dec 2020)

● **Vertical Axis -** Total consumption (for each month)

OR

● **Vertical Axis -** Average hourly consumption (by month)

● Subtask 2 (20 pts): Predictive plot

○ For each of the graphs above, the user must have the option to plot predicted values. The predicted values can be summed up or averaged out to match the actual values being plotted. For example, average hourly consumption by month should be plotted alongside average predicted hourly consumption by month. The average and predicted values should be distinguishable and labeled. For **only** the hourly energy consumption graph with hour on the horizontal axis, the graph must allow the user to plot the prediction intervals. Do not plot prediction intervals for any other graph type.

● Each user input can be designed in one of several ways, such as with a drop-down menu or a series of check-boxes. Figure 1 gives an example of what a graph of average hourly consumption by month may look like. Figure 2 gives an example of what a graph of hourly energy consumption with predictions and prediction intervals may look like.

● **Task 2 (20 points): Create a reactive plot of average predictions by group**
○ This graph will be used to analyze how close the predictions are to the actual values, on average. This graph will plot average actual and average predicted consumption on the vertical axis, and a time category on the horizontal axis. The averages will depend on the time category chosen. There must be the following choices for the time category: hour of day, day of week, week of year, and month. After choosing the time category, the user must be able to choose the meter to plot and the time range of data to include in the calculations. The time period can *only* include 2020 and beyond.
■ For example, say the user chooses hour of day, the Bryan Building meter, and January 2020 - September 2020. The graph would plot the average actual and average predicted consumption in Bryan from Jan-Sep 2020 by hour of the day. There would be one observation per hour in a day (24 total). Figures 3-5 give examples of what these graphs might look like.

Style and Appearance (15 points):

There are a few guidelines regarding the organization and style of the dashboard:
1) The dashboard must follow the UNCG Brand Guide as close as possible. The most important aspect is to use university colors where applicable. This will allow the dashboard to more easily be deployed on university servers upon completion.
2) The phrase "funded by the UNCG Green Fund" must be visible on the front page.
3) The dashboard (including all graphs and figures) must be appropriately labeled, including correct spelling and capitalization. This includes the axes and titles of graphs. Labels for each meter are provided in the attached excel spreadsheet.
Aside from these guidelines, the organization and style of the dashboard is up to you.

Usability (10 points):

While the primary users of the dashboard will be Facilities Operations staff, we hope the dashboard will be usable for an average UNCG student, faculty, or community member. Easy-touse
features and relevant instructions may help you in this category. For example, a question mark symbol that, when clicked, provides clarity about a graph may be a useful feature. Below is a short list of example dashboards created using Dash that may give you some ideas.
https://dash-gallery.plotly.host/dash-time-series/
https://dash-gallery.plotly.host/dash-oil-and-gas/
https://dash-gallery.plotly.host/dash-needle-plot/
https://dash-gallery.plotly.host/dash-web-trader/
https://dash-gallery.plotly.host/dash-interest-rate/

Programs and Documentation (15 points)

It is important that the code written for this dashboard is flexible and well-documented. This will help ITS at UNCG deploy the dashboard if your team wins. Clear documentation will be useful in the case that the code breaks, as well as if students work on future projects to extend or add to your dashboard.